

Department of Energy

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Subpart A—General Provisions

§ 960.1 Applicability.

These guidelines were developed in accordance with the requirements of Section 112(a) of the Nuclear Waste Policy Act of 1982 for use by the Secretary of Energy in evaluating the suitability of sites. The guidelines will be used for suitability evaluations and determinations made pursuant to Section 112(b). The guidelines set forth in this part are intended to complement the requirements set forth in the Act, 10 CFR part 60, and 40 CFR part 191. The DOE recognizes NRC jurisdiction for the resolution of differences between the guidelines and 10 CFR part 60. The guidelines have received the concurrence of the NRC. The DOE contemplates revising the guidelines from time to time, as permitted by the Act, to take into account revisions made to the above regulations and to otherwise update the guidelines as necessary. The DOE will submit the revisions to the NRC and obtain its concurrence before issuance.

[49 FR 47752, Dec. 6, 1984, as amended at 66 FR 57334, Nov. 14, 2001]

§ 960.2 Definitions.

As used in this part:

Accessible environment means the atmosphere, the land surface, surface water, oceans, and the portion of the lithosphere that is outside the controlled area.

Act means the Nuclear Waste Policy Act of 1982, as amended.

Active fault means a fault along which there is recurrent movement, which is usually indicated by small, periodic displacements or seismic activity.

Affected area means either the area of socioeconomic impact or the area of environmental impact, each of which will vary in size among potential repository sites.

Affected Indian tribe means any Indian tribe (1) within whose reservation boundaries a repository for radioactive waste is proposed to be located or (2) whose federally defined possessory or usage rights to other lands outside the reservation's boundaries arising out of congressionally ratified treaties may

be substantially and adversely affected by the locating of such a facility: *Provided*, That the Secretary of the Interior finds, upon the petition of the appropriate governmental officials of the tribe, that such effects are both substantial and adverse to the tribe.

Affected State means any State that (1) has been notified by the DOE in accordance with Section 116(a) of the Act as containing a potentially acceptable site; (2) contains a candidate site for site characterization or repository development; or (3) contains a site selected for repository development.

Application means the act of making a finding of compliance or noncompliance with the qualifying or disqualifying conditions specified in the guidelines of subparts C and D of this part.

Aquifer means a formation, a group of formations, or a part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Barrier means any material or structure that prevents or substantially delays the movement of water or radionuclides.

Candidate site means an area, within a geohydrologic setting, that is recommended by the Secretary of Energy under section 112 of the Act for site characterization, approved by the President under section 112 of the Act for characterization, or undergoing site characterization under section 113 of the Act.

Closure means final backfilling of the remaining open operational areas of the underground facility and boreholes after the termination of waste emplacement, culminating in the sealing of shafts.

Confining unit means a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

Containment means the confinement of radioactive waste within a designated boundary.

Controlled area means a surface location, to be marked by suitable monuments, extending horizontally no more than 10 kilometers in any direction from the outer boundary of the underground facility, and the underlying subsurface, which area has been com-

mitted to use as a geologic repository and from which incompatible activities would be prohibited before and after permanent closure.

Cumulative releases of radionuclides means the total number of curies of radionuclides entering the accessible environment in any 10,000-year period, normalized on the basis of radiotoxicity in accordance with 40 CFR part 191. The peak cumulative release of radionuclides refers to the 10,000-year period during which any such release attains its maximum predicted value.

Decommissioning means the permanent removal from service of surface facilities and components necessary for preclosure operations only, after repository closure, in accordance with regulatory requirements and environmental policies.

Determination means a decision by the Secretary that a site is suitable for site characterization for the selection of a repository, consistent with applications of the guidelines of subparts C and D of this part in accordance with the provisions set forth in subpart B of this part.

Disposal means the emplacement in a repository of high-level radioactive waste, spent nuclear fuel, or other highly radioactive material with no foreseeable intent of recovery, whether or not such emplacement permits the recovery of such waste, and the isolation of such waste from the accessible environment.

Disqualifying condition means a condition that, if present at a site, would eliminate that site from further consideration.

Disturbed zone means that portion of the controlled area, excluding shafts, whose physical or chemical properties are predicted to change as a result of underground facility construction or heat generated by the emplaced radioactive waste such that the resultant change of properties could have a significant effect on the performance of the geologic repository.

DOE means the U.S. Department of Energy or its duly authorized representatives.

Effective porosity means the amount of interconnected pore space and fracture openings available for the transmission of fluids, expressed as the ratio of the volume of interconnected pores and openings to the volume of rock.

Engineered-barrier system means the manmade components of a disposal system designed to prevent the release of radionuclides from the underground facility or into the geohydrologic setting. Such term includes the radioactive-waste form, radioactive-waste canisters, materials placed over and around such canisters, any other components of the waste package, and barriers used to seal penetrations in and into the underground facility.

Environmental assessment means the document required by section 112(b)(1)(E) of the Nuclear Waste Policy Act of 1982.

Environmental impact statement means the document required by section 102(2)(C) of the National Environmental Policy Act of 1969. Sections 114(a) and 114(f) of the Nuclear Waste Policy Act of 1982 include certain limitations on the National Environmental Policy Act requirements as they apply to the preparation of an environmental impact statement for the development of a repository at a characterized site.

EPA means the U.S. Environmental Protection Agency or its duly authorized representatives.

Evaluation means the act of carefully examining the characteristics of a site in relation to the requirements of the qualifying or disqualifying conditions specified in the guidelines of subparts C and D. Evaluation includes the consideration of favorable and potentially adverse conditions.

Excepted means assumed to be probable or certain on the basis of existing evidence and in the absence of significant evidence to the contrary.

Expected repository performance means the manner in which the repository is predicted to function, consideration those conditions, processes, and events that are likely to prevail or may occur during the time period of interest.

Facility means any structure, system, or system component, including engineered barriers, created by the DOE to meet repository-performance or functional objectives.

Fault means a fracture or a zone of fractures along which there has been displacement of the side relative to one another parallel to the fracture or zone of fractures.

Faulting means the process of fracturing and displacement that produces a fault.

Favorable condition means a condition that, though not necessary to qualify a site, is presumed, if present, to enhance confidence that the qualifying condition of a particular guideline can be met.

Finding means a conclusion that is reached after evaluation.

Geohydrologic setting means the system of geohydrologic units that is located within a given geologic setting.

Geohydrologic system means the geohydrologic units within a geologic setting, including any recharge, discharge, interconnections between units, and any natural or man-induced processes or events that could affect ground-water flow within or among those units.

Geohydrologic unit means an aquifer, a confining unit, or a combination of aquifers and confining units comprising a framework for a reasonably distinct geohydrologic system.

Geologic repository means a system, requiring licensing by the NRC, that is intended to be used, or may be used, for the disposal of radioactive waste in excavated geologic media. A geologic repository includes (1) the geologic-repository operations area and (2) the portion of the geologic setting that provides isolation of the radioactive waste and is located within the controlled area.

Geologic-repository operations area means a radioactive-waste facility that is part of the geologic repository, including both surface and subsurface areas and facilities where waste-handling activities are conducted.

Geologic setting means the geologic, hydrologic, and geochemical systems of the region in which a geologic-repository operations area is or may be located.

Geomorphic processes means geologic processes that are responsible for the general configuration of the Earth's surface, including the development of

present landforms and their relationships to underlying structures, and are responsible for the geologic changes recorded by these surface features.

Ground water means all subsurface water as distinct from surface water.

Ground-water flux means the rate of ground-water flow per unit area of porous or fractured media measured perpendicular to the direction of flow.

Ground-water sources means aquifers that have been or could be economically and technologically developed as sources of water in the foreseeable future.

Ground-water travel time means the time required for a unit volume of ground water to travel between two locations. The travel time is the length of the flow path divided by the velocity, where velocity is the average ground-water flux passing through the cross-sectional area of the geologic medium through which flow occurs, perpendicular to the flow direction, divided by the effective porosity along the flow path. If discrete segments of the flow path have different hydrologic properties, the total travel time will be the sum of the travel times for each discrete segment.

Guideline means a statement of policy or procedure that may include, when appropriate, qualifying, disqualifying, favorable, or potentially adverse conditions as specified in the "guidelines."

Guidelines means part 960 of title 10 of the Code of Federal Regulations—General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories.

High-level radioactive waste means (1) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations and (2) other highly radioactive material that the NRC, consistent with existing law, determines by rule requires permanent isolation.

Highly populated area means any incorporated place (recognized by the decennial reports of the U.S. Bureau of the Census) of 2,500 or more persons, or any census designated place (as defined

and delineated by the Bureau) of 2,500 or more persons, unless it can be demonstrated that any such place has a lower population density than the mean value for the continental United States. Counties or county equivalents, whether incorporated or not, are specifically excluded from the definition of "place" as used herein.

Host rock means the geologic medium in which the waste is emplaced, specifically the geologic materials that directly encompass and are in close proximity to the underground facility.

Hydraulic conductivity means the volume of water that will move through a medium in a unit of time under a unit hydraulic gradient through a unit area measured perpendicular to the direction of flow.

Hydraulic gradient means a change in the static pressure of ground water, expressed in terms of the height of water above a datum, per unit of distance in a given direction.

Hydrologic process means any hydrologic phenomenon that exhibits a continuous change in time, whether slow or rapid.

Hydrologic properties means those properties of a rock that govern the entrance of water and the capacity to hold, transmit, and deliver water, such as porosity, effective porosity, specific retention, permeability, and the directions of maximum and minimum permeabilities.

Igneous activity means the emplacement (intrusion) of molten rock material (magma) into material in the Earth's crust or the expulsion (extrusion) of such material onto the Earth's surface or into its atmosphere or surface water.

Isolation means inhibiting the transport of radioactive material so that the amounts and concentrations of this material entering the accessible environment will be kept within prescribed limits.

Likely means processing or displaying the qualities, characteristics, or attributes that provide a reasonable basis for confidence that what is expected indeed exists or will occur.

Lithosphere means the solid part of the Earth, including any ground water contained within it.

Member of the public means any individual who is not engaged in operations involving the management, storage, and disposal of radioactive waste. A worker so engaged is a member of the public except when on duty at the geologic-repository operations area.

Mitigation means: (1) Avoiding the impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or (5) compensating for the impact by replacing or providing substitute resources or environments.

Model means a conceptual description and the associated mathematical representation of a system, subsystem, component, or condition that is used to predict changes from a baseline state as a function of internal and/or external stimuli and as a function of time and space.

NRC means the U.S. Nuclear Regulatory Commission or its duly authorized representatives.

Perched ground water means unconfined ground water separated from an underlying body of ground water by an unsaturated zone. Its water table is a perched water table. Perched ground water is held up by a perching bed whose permeability is so low that water percolating downward through it is not able to bring water in the underlying unsaturated zone above atmospheric pressure.

Performance assessment means any analysis that predicts the behavior of a system or system component under a given set of constant and/or transient conditions. Performance assessments will include estimates of the effects of uncertainties in data and modeling.

Permanent closure is synonymous with "closure."

Postclosure means the period of time after the closure of the geologic repository.

Potentially acceptable site means any site at which, after geologic studies and field mapping but before detailed geologic data gathering, the DOE un-

dertakes preliminary drilling and geophysical testing for the definition of site location.

Potentially adverse condition means a condition that is presumed to detract from expected system performance, but further evaluation, additional data, or the identification of compensating or mitigating factors may indicate that its effect on the expected system performance is acceptable.

Preclosure means the period of time before and during the closure of the geologic repository.

Pre-waste-emplacement means before the authorization of repository construction by the NRC.

Qualifying condition means a condition that must be satisfied for a site to be considered acceptable with respect to a specific guideline.

Quaternary Period means the second period of the Cenozoic Era, following the Tertiary, beginning 2 to 3 million years ago and extending to the present.

Radioactive waste or "waste" means high-level radioactive waste and other radioactive materials, including spent nuclear fuel, that are received for emplacement in a geologic repository.

Radioactive-waste facility means a facility subject to the licensing and related regulatory authority of the NRC pursuant to Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974 (88 Stat. 1244).

Radionuclide retardation means the process or processes that cause the time required for a given radionuclide to move between two locations to be greater than the ground-water travel time, because of physical and chemical interactions between the radionuclide and the geohydrologic unit through which the radionuclide travels.

Reasonably available technology means technology which exists and has been demonstrated or for which the results of any requisite development, demonstration, or confirmatory testing efforts before application will be available within the required time period.

Repository is synonymous with "geologic repository."

Repository closure is synonymous with "closure."

Repository construction means all excavation and mining activities associated with the construction of shafts,

shaft stations, rooms, and necessary openings in the underground facility, preparatory to radioactive-waste emplacement, as well as the construction of necessary surface facilities, but excluding site-characterization activities.

Repository operation means all of the functions at the site leading to and involving radioactive-waste emplacement in the underground facility, including receiving, transportation, handling, emplacement, and, if necessary, retrieval.

Repository support facilities means all permanent facilities constructed in support of site-characterization activities and repository construction, operation, and closure activities, including surface structures, utility lines, roads, railroads, and similar facilities, but excluding the underground facility.

Restricted area means any area access to which is controlled by the DOE for purposes of protecting individuals from exposure to radiation and radioactive materials before repository closure, but not including any areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.

Retrieval means the act of intentionally removing radioactive waste before repository closure from the underground location at which the waste had been previously emplaced for disposal.

Saturated zone means that part of the Earth's crust beneath the water table in which all voids, large and small, are ideally filled with water under pressure greater than atmospheric.

Secretary means the Secretary of Energy.

Site means a potentially acceptable site or a candidate site, as appropriate, until such time as the controlled area has been established, at which time the site and the controlled area are the same.

Site characterization means activities, whether in the laboratory or in the field, undertaken to establish the geologic conditions and the ranges of the parameters of a candidate site relevant to the location of a repository, including borings, surface excavations, excavations of exploratory shafts, limited

subsurface lateral excavations and borings, and in situ testing needed to evaluate the suitability of a candidate site for the location of a repository, but not including preliminary borings and geophysical testing needed to assess whether site characterization should be undertaken.

Siting means the collection of exploration, testing, evaluation, and decision-making activities associated with the process of site screening, site nomination, site recommendation, and site approval for characterization or repository development.

Source term means the kinds and amounts of radionuclides that make up the source of a potential release of radioactivity.

Spent nuclear fuel means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

Surface facilities means repository support facilities within the restricted area.

Surface water means any waters on the surface of the Earth, including fresh and salt water, ice, and snow.

System means the geologic setting at the site, the waste package, and the repository, all acting together to contain and isolate the waste.

System performance means the complete behavior of a repository system in response to the conditions, processes, and events that may affect it.

Tectonic means of, or pertaining to, the forces involved in, or the resulting structures or features of, *tectonics*.

Tectonics means the branch of geology dealing with the broad architecture of the outer part of the Earth, that is, the regional assembling of structural or deformational features and the study of their mutual relations, origin, and historical evolution.

To the extent practicable means the degree to which an intended course of action is capable of being effected in a manner that is reasonable and feasible within a framework of constraints.

Underground facility means the underground structure and the rock required for support, including mined openings and backfill materials, but excluding shafts, boreholes, and their seals.

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Unsaturated zone means the zone between the land surface and the water table. Generally, water in this zone is under less than atmospheric pressure, and some of the voids may contain air or other gases at atmospheric pressure. Beneath flooded areas or in perched water bodies, the water pressure locally may be greater than atmospheric.

Waste form means the radioactive waste materials and any encapsulating or stabilizing matrix.

Waste package means the waste form and any containers, shielding, packing, and other sorbent materials immediately surrounding an individual waste container.

Water table means that surface in a body of ground water at which the water pressure is atmospheric.

[49 FR 47752, Dec. 6, 1984, as amended at 66 FR 57334, Nov. 14, 2001]

Subpart B—Implementation Guidelines

§ 960.3 Implementation guidelines.

The guidelines of this subpart establish the procedure and basis for applying the postclosure and the preclosure guidelines of subparts C and D, respectively, to evaluations of the suitability of sites. As may be appropriate during the siting process, this procedure requires consideration of a variety of geohydrologic settings and rock types, regionality, and environmental impacts and consultation with affected States, affected Indian tribes, and Federal agencies.

[49 FR 47752, Dec. 6, 1984, as amended at 66 FR 57334, Nov. 14, 2001]

§ 960.3-1 Siting provisions.

The siting provisions establish the framework for the implementation of the siting process specified in § 960.3-2. Sections 960.3-1-1 and 960.3-1-2 require that consideration be given to sites situated in different geohydrologic settings and different types of host rock, respectively. These diversity guidelines are intended to balance the process of site selection by requiring consideration of a variety of geologic conditions and media, and thereby enhance confidence in the technical suitability of sites selected for the development of

repositories. As required by the Act, § 960.3-1-3 specifies consideration of a regional distribution of repositories after recommendation of a site for development of the first repository. Section 960.3-1-4 describes the evidence that is required to support siting decisions. Section 960.3-1-5 establishes the basis for site evaluations against the postclosure and the preclosure guidelines of subparts C and D during the various phases of the siting process.

§ 960.3-1-1 Diversity of geohydrologic settings.

Consideration shall be given to a variety of geohydrologic settings in which sites for the development of repositories may be located. To the extent practicable, sites recommended as candidate sites for characterization shall be located in different geohydrologic settings.

§ 960.3-1-2 Diversity of rock types.

Consideration shall be given to a variety of geologic media in which sites for the development of repositories may be located. To the extent practicable, and with due consideration of candidate sites characterized previously or approved for such characterization if the circumstances apply, sites recommended as candidate sites for characterization shall have different types of host rock.

§ 960.3-1-3 Regionality.

In making site recommendations for repository development after the site for the first repository has been recommended, the Secretary shall give due consideration to the need for, and the advantages of, a regional distribution in the siting of subsequent repositories. Such consideration shall take into account the proximity of sites to locations at which waste is generated or temporarily stored and at which other repositories have been or are being developed.

§ 960.3-1-4 Evidence for siting decisions.

The siting process involves a sequence of four decisions: The identification of potentially acceptable sites; the nomination of sites as suitable for characterization; the recommendation